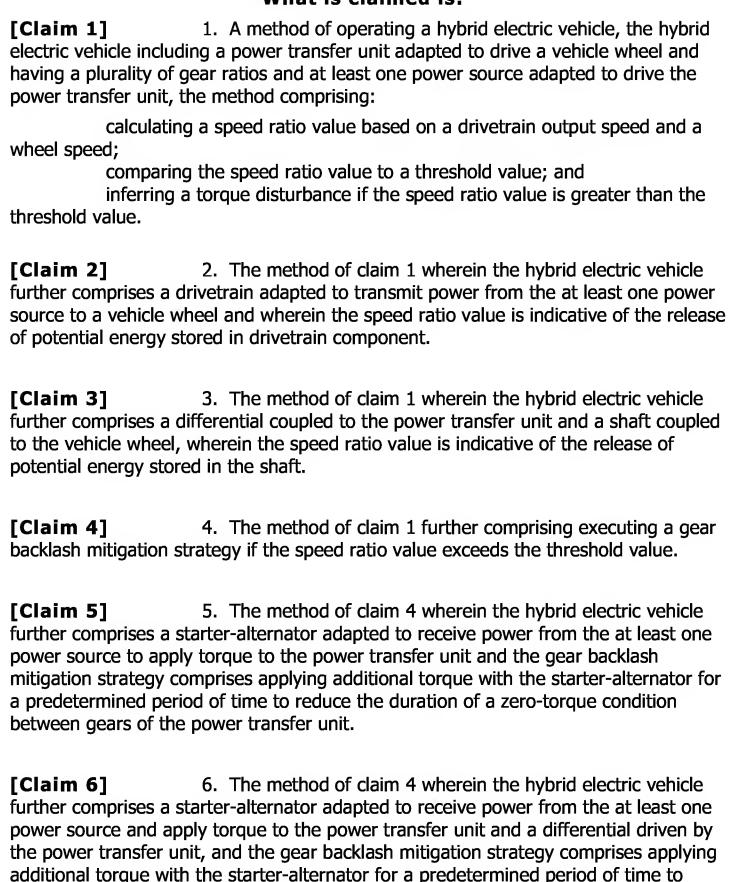
What is claimed is:



reduce the duration of a zero-torque condition between gears of the differential.

[Claim 7] 7. The method of claim 1 wherein the speed ratio value is determined as a function of the expression

$$[DS(t) - DS(t-k)]^A + B]/[WS(t) - WS(t-k)]^A + B]$$

where:

A is an even integer, B and k are constants,

DS(t) is a drivetrain output speed at time t,

DS(t-k) is the drivetrain output speed at time t-k, WS(t) is an average wheel speed at time t, and WS(t-k) is the average wheel speed at time t-k.

[Claim 8] 8. The method of claim 7 wherein the drivetrain output speed is measured at an output shaft of the power transfer unit.

[Claim 9] 9. The method of claim 7 wherein the drivetrain output speed is measured at an output shaft of a starter-alternator.

[Claim 10] 10. The method of claim 7 wherein the drivetrain output speed is measured at an output shaft of the power source.

[Claim 11] 11. A method for inhibiting gear backlash in a drivetrain of a hybrid electric vehicle, the hybrid electric vehicle including a power transfer unit having a plurality of gear ratios adapted to drive a set of vehicle wheels, a set of power sources, a starter-alternator adapted to be powered by at least one member of the set of power sources, a first signal indicative of a drivetrain output speed, and a second signal indicative of an average speed of the set of wheels, the method comprising:

calculating a speed ratio value as a function of the first and second signals, the first and second signals being sampled at a first time interval and a second time interval;

determining whether the speed ratio value is greater than a threshold value; and

executing a gear backlash mitigation strategy if the speed ratio value exceeds the threshold value.

[Claim 12] 12. The method of claim 11 wherein the gear backlash mitigation strategy includes reducing an output torque of the starter-alternator for a predetermined period of time.

- **[Claim 13]** 13. The method of claim 11 wherein the gear backlash mitigation strategy includes decreasing power provided by the at least one member of the set of power sources.
- **[Claim 14]** 14. The method of claim 11 wherein the gear backlash mitigation strategy includes reversing a direction of torque provided by the power transfer unit for a predetermined period of time.
- [Claim 15] 15. The method of claim 11 wherein the gear backlash mitigation strategy includes reversing a direction of torque provided to the power transfer unit for a predetermined period of time.
- **[Claim 16]** 16. The method of claim 11 wherein the first signal is measured at the power transfer unit.
- [Claim 17] 17. The method of claim 11 wherein the first signal is based on a rotational speed of the starter-alternator.
- **[Claim 18]** 18. The method of claim 11 wherein the set of power sources includes an engine, and wherein the first signal is measured at an engine output shaft.
- [Claim 19] 19. A method for detecting a zero-torque condition in a drivetrain of a hybrid electric vehicle, the hybrid electric vehicle including a power transfer unit adapted to drive at least one vehicle wheel and having a plurality of gear ratios, a set of power sources including an engine and at least one voltage source, a starter-alternator adapted to be powered by at least one member of the set of power sources, a first signal indicative of a drivetrain output speed, and a second signal indicative of an average wheel speed, the method comprising:

calculating a speed ratio value indicative of a zero-torque condition as a function of the first and second signals, the first and second signals being sampled at first and second time intervals;

determining whether the speed ratio value is greater than a threshold value; and

executing a mitigation strategy to reduce the duration of the zero-torque condition if the speed ratio value exceeds the threshold value.

[Claim 20] 20. The method of claim 19, the hybrid electric vehicle further comprising a differential coupled to the power transfer unit and a shaft coupled to the vehicle wheel, wherein the speed ratio value is indicative of the release of potential energy stored in the shaft.